What is Claimed is:

1. A device for a precision alignment of a write element on a tape head with a transport direction of a media that is transported across the tape head and having opposed edges, comprising:

at least one alignment element cofabricated with the write element so that both the write element and the alignment element have a first fixed orientation with respect to a magnetic axis of the tape head,

the write element and the alignment element are adapted to generate a magnetic field induced by a write current supplied to the tape head,

the magnetic field from the write element is operative to write a plurality of write transitions on the media thereby defining a write band thereon,

the magnetic field from the alignment element is operative to write a plurality of alignment transitions on the media thereby defining an alignment band thereon, the alignment transitions have a recorded orientation with respect to the transport direction, and

wherein the precision alignment is obtained by observing the alignment transitions in the alignment band and adjusting a head-to-media angle between the magnetic axis and the transport direction until the recorded orientation of the alignment transitions is indicative of the write element having a preferred orientation with respect to the transport direction.

2. The device as set forth in Claim 1, wherein the alignment element is positioned so that the alignment transitions neither interfere with nor overwrite the written transitions and do not occupy an area on the media predesignated for other uses.

3. The device as set forth in Claim 2, wherein the area on the media

predesignated for other uses conforms with a format specification.

4. The device as set forth in Claim 3, wherein the format specification is selected from the group consisting of a Liner Tape-Open format, an **ULTRIUM** format, a **TRAVAN** format, and a **MAGSTAR MP 3570** format.

5. The device as set forth in Claim 1, wherein the written transitions comprise servo code that is prerecorded on the media.

6. The device as set forth in Claim 1, wherein the preferred orientation is perpendicular to the transport direction.

7. The device as set forth in Claim 6, wherein the head-to-media angle is 90 degrees when the preferred orientation is perpendicular to the transport direction.

8. The device as set forth in Claim 1, wherein the first fixed orientation of the alignment element is colinear with the magnetic axis so that the alignment element is aligned along the magnetic axis.

9. The device as set forth in Claim 1, wherein the first fixed orientation of the alignment element is parallel to the magnetic axis and the alignment element has a position that is offset from the magnetic axis.

10. The device as set forth in Claim 1, wherein the alignment element has a length that is from about 10 micrometers long to about 300 micrometers long.

11. The device as set forth in Claim 1, wherein the alignment element has a line width that is a selected one of less than 1.0 micrometer and greater than or equal to 1.0 micrometer.

12. The device as set forth in Claim 1, wherein the write element has a first line width and the alignment element has a line width that is less than or equal to the

first line width of the write el ment.

13. The device as set forth in Claim 12, wherein the first line width of the writ. element is a selected one of less than 1.0 micrometer and greater than or equal to 1.0 micrometer.

14. The device as set forth in Claim 1, wherein observing the alignment transitions comprises applying a magnetically reactive material to the media to render the alignment transitions visible so that the recorded orientation of the alignment transitions can be visually compared with a reference point to determine if the recorded orientation is indicative of the write element having the preferred orientation with respect to the transport direction.

15. The device as set forth in Claim 14, wherein the magnetically reactive material comprises a material selected from the group consisting of ferromagnetic particles and ferrofluid.

16. The device as set forth in Claim 14, wherein the reference point is any selected one of the opposed edges and the transport direction.

17. The device as set forth in Claim 1, wherein observing the alignment transitions comprises using a separate read head positioned in fixed relation to the tape head, the read head including a first read element adapted to generate a first read signal from the alignment transitions in the alignment band as the media is transported across the read head, and

wherein the head-to-media angle is adjusted until the first read signal matches a predetermined signature that is indicative of the recorded orientation having a preferred alignment with respect to the transport direction such that the predetermined signature is also indicative of the write element having the preferred orientation with respect to the transport direction.

18. The device as set forth in Claim 17, wherein the preferred alignment is perpendicular to the transport dir ction.

19. The device as set forth in Claim 17, wherein the read head further comprises a second read element adapted to generate a second read signal from the alignment transitions in an adjacent alignment band as the media is transported across the read head, and wherein the predetermined signature comprises the first and second read signals occurring nearly simultaneously in time within a specified tolerance.

20. The device as set forth in Claim 1, wherein the alignment element is spaced apart from another alignment element by a first variable pitch.

21. The device as set forth in Claim 1 and further comprising:

a first gross alignment pattern including at least one horizontal element and positioned at a first end of the magnetic axis;

a second gross alignment pattern including at least one horizontal element and positioned at a second end of the magnetic axis,

the horizontal elements of the first and second gross alignment patterns are cofabricated with the write element and the alignment element and each horizontal element has a second fixed orientation with respect to the magnetic axis,

wherein as the media is transported across the tape head a first one of the opposed edges is adjacent to the first gross alignment pattern and the horizontal element thereof is visible outside the first one of the opposed edges and a second one of the opposed edges is adjacent to the second gross alignment pattern and the horizontal element thereof is visible outside the second one of the opposed edges, and

wherein a gross visual alignment between the magnetic axis and the transport direction is obtain d by adjusting the head-to-media angl until either on or both of the horizontal elements is parallel to its respectiv first or s cond on of the opposed edges and subsequent to the gross visual alignment the tape head can be repositioned to conceal the visible horizontal elements.

22. The device as set forth in Claim 21, wherein the horizontal element is spaced apart from another horizontal element in their respective first and second gross alignment patterns by a second variable pitch.

23. The device as set forth in Claim 22, wherein the second variable pitch is in a range from about 20 micrometers to about 200 micrometers.

24. The device as set forth in Claim 21 wherein the horizontal elements of the first and second gross alignment patterns have a height that is a selected one of less than 1.0 micrometer and greater than or equal to 1.0 micrometer.

25. The device as set forth in Claim 21 wherein the horizontal elements of the first and second gross alignment patterns have a width from about 50 micrometers wide to about 1.0 millimeters wide.

26. The device as set forth in Claim 21, wherein the horizontal elements in the first and second gross alignment patterns that are visible outside of their respective opposed edges are used for adjusting the tape head to visually center the tape head with the media.

27. The device as set forth in Claim 21, wherein the first and second gross alignment patterns further comprise:

a vertical element that is colinear with the magnetic axis and is cofabricated with the horizontal element, and

wherein at l ast a portion of the vertical elements in the first and second gross alignment patterns are visibl outside their resp ctive oppos d edg s so that both vertical el ments serve as an accurate visual indication of the location of th magnetic axis relative to the transport direction and the gross visual alignment between the magnetic axis and the transport direction is obtained by adjusting the head-to-media angle until either one or both of the vertical elements has a preferred edge orientation with its respective first or second one of the opposed edges.

28. The device as set forth in Claim 27, wherein the preferred edge orientation is perpendicular to the opposed edges.

29. The device as set forth in Claim 27, wherein the vertical element has a line width that is from about 0.5 micrometers wide to about 3.0 micrometers wide.

30. The device as set forth in Claim 27, wherein each of the alignment elements has a second line width and the vertical element has a third line width that is greater than or equal to the second line width.

31. The device as set forth in Claim 1 and further comprising:

at least one read element that is cofabricated with the write element and the alignment element, the read element is aligned with the alignment element so that the alignment transitions pass over the read element as the media is transported across the tape head in the transport direction,

the read element is adapted to generate a read signal in response to the alignment transitions, and

the read signal is analyzed to determine if a magnitude of the read signal is indicative of a successfully written alignment transition.

32. The device as set forth in Claim 31, wherein the write current to the alignment

element is increased when the magnitude of the read signal is not indicative of a successfully written alignment transition.

33. The device as set forth in Claim 1, wherein the tape head is a component selected from the group consisting of a closed-loop servo head, a thin-film magnetoresistive head, and a thin-film magnetoresistive servo-write head.

34. The device as set forth in Claim 1, wherein the write element has a shape selected from the group consisting of a full chevron pattern, a partial chevron pattern, a full diamond pattern, and a partial diamond pattern.

35. The device as set forth in Claim 1, wherein the alignment element is positioned so that the alignment transitions occupy an area on the media predesignated for other uses.

36. The device as set forth in Claim 35, wherein the area on the media predesignated for other uses conforms with a format specification.

37. The device as set forth in Claim 35, wherein the media is transported across a separate data head in a direction of transport, the data head including a plurality of data elements formed along a magnetic axis of the data head, each of the data elements is adapted to generate a data signal in response to the alignment transitions that pass over that data element, the alignment transitions are prerecorded on the media and have the preferred alignment with respect to the transport direction, and

wherein a precision alignment between the data head and the direction of transport is obtained by analyzing the data signals from at least two of the data elements and adjusting a data-head-to-media angle between the magnetic axis and the direction of transport until the data signals match a signature that is indicative of the data head having a preferred azimuth angle with respect to the direction of transport.

38. The device as set forth in Claim 37, wherein the data head further comprises at least one write element that is formed along the magnetic axis and both the write element and the data elements are aligned with the direction of transport when the data head has the preferred azimuth angle with respect to the direction of transport.

39. A device for gross visual alignment of a write element of a tape head with a transport direction of a media that is transported across the tape head and having opposed edges, comprising:

a first gross alignment pattern including at least one horizontal element and positioned at a first end of a magnetic axis of the tape head;

a second gross alignment pattern including at least one horizontal element and positioned at a second end of the magnetic axis,

the horizontal elements of the first and second gross alignment patterns are cofabricated with the write element and each horizontal element has a second fixed orientation with respect to the magnetic axis,

the write element is adapted to generate a magnetic field induced by a write current supplied to the tape head and the magnetic field is operative to write a plurality of write transitions on the media thereby defining a write band thereon,

wherein as the media is transported across the tape head a first one of the opposed edges is adjacent to the first gross alignment pattern and the horizontal element thereof is visible outside the first one of the opposed edges and a second one of the opposed edges is adjacent to the second gross alignment pattern and the horizontal element thereof is visible outside the second one of the opposed edges, and

wherein the gross visual alignment of the write element with the transport direction is obtained by adjusting a head-to-media angle between the magnetic axis and the transport direction until either one or both of the horizontal elements is

parallel to its respective first or s cond one of the opposed edges.

40. The device as set forth in Claim 39, wh rein th first and second gross alignment patterns further include a plurality of horizontal elements and the horizontal elements are spaced apart by a second variable pitch.

41. The device as set forth in Claim 39, wherein the horizontal elements in the first and second gross alignment patterns that are visible outside of their respective opposed edges are used for adjusting the tape head to visually center the tape head with the media.

42. The device as set forth in Claim 39, wherein the first and second gross alignment patterns further comprise:

a vertical element that is colinear with the magnetic axis and is cofabricated with the horizontal element, and

wherein at least a portion of the vertical elements in the first and second gross alignment patterns are visible outside their respective opposed edges so that both vertical elements serve as an accurate visual indication of the location of the magnetic axis relative to the transport direction, and

wherein the gross visual alignment of the write element with the transport direction is obtained by adjusting the head-to-media angle until either one or both of the vertical elements has a preferred edge orientation with its respective first or second tape edge.

43. The device as set forth in Claim 42, wherein the preferred edge orientation is perpendicular to the opposed edges.

44. A device for using at least one data element of a data head for a precision

alignment of the data h ad with resp ct to a direction of transport of a media that is transported across the data head, comprising:

a plurality of alignment transitions prerecorded on the m dia in an alignm nt band with a preferred alignment with respect to the direction of transport,

the data element is adapted to generate a data signal in response to the alignment transitions that pass over the data element as the media is transported across the data head in the direction of transport; and

an azimuth control unit for adjusting an azimuth angle between the data head and the direction of transport, the azimuth control unit receives the data signal and is connected with the data head, and

wherein the precision alignment is obtained by analyzing the data signal and adjusting a data-head-to-media angle between the data head and the direction of transport until the data signal matches a signature that is indicative of the data head having a preferred azimuth angle with respect to the direction of transport.

45. The system as set forth in Claim 44, wherein the preferred azimuth angle is perpendicular to the direction of transport.

46. The system as set forth in Claim 44, wherein the data element is adapted to generate a magnetic field in response to a data current supplied to the data head and the magnetic field is operative to overwrite at least a portion of the alignment transitions with a plurality of data transitions.